REMARKS

Applicants appreciate the Examiner's thorough examination of the subject application and request reconsideration of the subject application based on the foregoing amendments and the following remarks.

Claims 2-59 are pending in the subject application.

Claims 1, 14, 15, 18, 23, 31 and 35 were previously canceled.

Claim 5 is acknowledged as being allowable by the Examiner.

Claims 28-30, 32-34, 36, 37 and 54-59 are withdrawn from consideration as the result of an Examiner's earlier restriction requirement. In this regard, and as requested in the above-referenced Office Action, Applicants affirm the election of Group I.

In view of the Examiner's restriction requirement, Applicants reserve the right to present the above-identified withdrawn claims in a divisional application. More specifically; the claims withdrawn from prosecution, namely claims 28-30, 32-34, 36, 37 and 54-59 were canceled in the instant amendment without prejudice to prosecuting these claims in a continuing/divisional application.

Claims 2-4, 6-9, 16, 17, 19-22, 24-27 and 44-53 stand rejected under 35 U.S.C. §103.

Claims 10-13 and 38-43 were objected to as depending from a rejected base claim; however, the Examiner indicated that these claims would be allowable if appropriately re-written in independent form.

Claims 10-13 and 38-43 were written in independent form as suggested by the Examiner.

Claims 7-9, 16-17, 19-22, 24-27 and 44-53 are canceled in the foregoing amendment. Such cancellation shall not be construed by the Examiner as acquiescence by Applicants to the rejections of these claims and also such cancellation is done without prejudice to prosecuting these claims in a continuing application. In view of the cancellation of these claims, Applicants do not believe it necessary to address any rejections directed to these claims further herein.

Claim 2 was amended to clarify that the common electrode is on a second substrate, not the substrate on which the on which the pixel electrodes, pixel switching elements and the signal lines are formed.

Claim 3 was amended for clarity. More particularly, claim 3 was amended to indicate that there is a difference in the pulse width when the tone to be displayed or expressed is the same.

The amendments to the claims are supported by the originally filed disclosure.

35 U.S.C. §103 REJECTIONS

Claims 2-4, 6-9, 16, 17, 19-22, 24-27 and 44-53 stand rejected under 35 U.S.C. § 103 as being unpatentable over the cited prior art for the reasons provided on pages 2-19 of the above-referenced Office Action. Because claims 7-9, 16-17, 19-22, 24-27 and 44-53 were canceled in the foregoing amendment, the rejection(s) as to these claims is not addressed further herein. Because claim(s) was/were amended in the instant amendment, the following discussion refers to

the language of the amended claim(s). However, only those amended features specifically relied upon to distinguish the claimed invention from the cited prior art shall be considered as being made to overcome the cited reference. The following addresses the specific rejections provided in the above-referenced Office Action.

CLAIMS 2, 3 & 6

Claims 2, 3 and 6 stand rejected as being unpatentable over Kikkawa [USP 6,577,295] for the reasons provided on pages 2-4 of the above referenced Office Action. Applicants respectfully traverse. The following separately addresses the rejection of each of claims 2, 3 and 6.

Claim 2

As grounds for the rejection, the Office Action refers to the simulation potentials described in Kikkawa and the resultant potential across the pixel (*i.e.*, voltage difference between the common electrode Vcom and the voltage applied to the signal line in what Kikkawa refers to as the positive and the negative voltage frame period. It is further asserted that the prior art does specifically teach that the signal lines (voltage of signal lines) become different depending upon the polarities. It then is apparently asserted, that it would have been obvious to modify the signal lines to become different depending on the polarities to achieve a negative voltage frame period, a potential difference of 5 volts having a polarity opposite to the polarity in the positive voltage frame period to generate the desired parallel electric field. Applicants respectfully traverse.

Applicants claim, claim 2, a method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode being formed on a second substrate for applying a common potential to pixels. Such a method includes controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines, wherein the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and wherein a proportion of a maximum value of the voltage applied to the pixel electrodes with respect to the voltage supplied to the signal lines becomes different depending on a polarity of the voltage applied to the pixel electrodes.

Kikkawa describes that, because the voltage of the pixel electrode 17 becomes lower than the voltage (V d) of the signal line 14, a potential difference between the pixel electrode 17 and the common electrode 15 is 5 volts in the LCD device driven by a dot-inversion drive system (see column 7, lines 12-33 thereof). Moreover, Kikkawa further describes that a simulation calculation is carried out for the case that voltage (Vg) of the scanning line 13 is 21 volts in an on-state and -8 volts in an off-state thereof, voltage (Vd) of the signal line 14 is 12 volts in a positive voltage frame period and 2 volts in a negative voltage frame period, and voltage (V com) of the common electrode 15 is fixed at 6 volts (see column 7, lines 12-33 thereof).

Although, Kikkawa might seem to satisfy the condition in which a proportion of a maximum value of the voltage applied to the pixel electrodes with respect to the voltage supplied to the signal lines becomes different depending on a polarity of the voltage applied to the pixel electrodes, it does not teach nor describe the driving method of the present invention. The method of the present invention carries out pulse width modulation driving, whereas and in contrast to the present invention, Kikkawa describe carrying out voltage modulation or voltage variance driving. It is on this account that the above condition for the simulation is set.

As described and taught in the present invention, due to the difference in a function of a charging time between a positive application and a negative application, a proportion of a maximum value of the voltage applied to the pixel electrodes with respect to the voltage supplied to the signal lines becomes different depending on a polarity of the voltage applied to the pixel electrodes, as described above. Thus, the required intervals of a pulse do not become too small even at high tone levels. As a result, it is possible to prevent change in tone level due to external factors such as temperature, signal delays or the like. Further, it is possible to adopt a lower frequency for a reference clock, which is required to create a signal of a predetermined pulse width within a signal line driver (see subject application from the last paragraph on page 14 to the 8th line on page 16).

Moreover, according to the present invention, the maximum value of an amplitude of a voltage applied to the pixel electrodes is not less than 80 % and not more than 98 % of an amplitude of a voltage supplied to the signal lines. Thus, it is possible to avoid the area of

markedly *poor* efficiency where there is no substantial increase in pixel voltage as a function of charging time, and the linearity of the charging characteristics can be improved (from the 20th line on page 95 to the 13th line on page 96).

That is, the present invention is concerned with pulse width modulation driving, and therefore discussion of the above effects is only logical when discussed in relation to a system employing pulse width modulation driving. As Kikkawa employs a *different* driving method, Kikkawa cannot obtain the above effects of the present invention, and it is respectfully submitted that discussion of such effects in terms of the system employed by Kikkawa is illogical. Moreover, since Kikkawa does not disclose pulse width modulation driving, applying Kikkawa to pulse width modulation driving methodologies could only be realized based on the teachings in the subject application. Furthermore, there is no suggestion or teaching anywhere in Kikkawa that would reasonably apprise one skilled in the art that applying Kikkawa to pulse width modulation driving methodologies would yield a methodology that would be reasonably successful.

It is respectfully submitted that claim 2 is patentable over the cited reference(s) at least for the foregoing reasons. Applicants, however, also have amended claim 2 herein, so as to clarify that common electrode is on a second substrate, not the substrate on which the on which the pixel electrodes, pixel switching elements and the signal lines are formed. This does not correspond to the structure disclosed in Kikkawa as all of the electrodes in Kikkawa including the common electrode are disposed on the same substrate.

It is respectfully submitted that claim 2 is patentable over the cited reference(s) for the foregoing reasons.

Claim 3

As grounds for the rejection, the Office Action refers to the simulation potentials described in Kikkawa and the resultant potential across the pixel (*i.e.*, voltage difference between the common electrode Vcom and the voltage applied to the signal line in what Kikkawa refers to as the positive and the negative voltage frame period. The Office Action thus appears to assert that method of claim 3 is unpatentable over Kikkawa in view of these voltage disclosures. Applicants respectfully traverse.

Applicants claim, claim 3, a method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines. According to this method, the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and the pulse width of a supplied voltage to the signal lines in the conduction period of the pixel switching elements becomes different depending on a polarity of the voltage applied to the pixel electrodes, even when displaying the same tone.

The terms pulse width, tone, pulse width modulation and PWM do not appear anywhere in Kikkawa. Specifically, a copy of USP 6,577,295 was down loaded from the USPTO website and a search was made using Word's search engines for each of these phrases and there was no indications from such searches that these phrases/words appeared in Kikkawa. Although voltage pulses are depicted in Figures 4, 7 and 10 of Kikkawa; such a dislcosure hardly corresponds to an indication of the technique used for displaying or expressing tones. Applicants also refer to the foregoing related remarks provided above concerning the rejeciton of claim 2.

Further, the discussion in col. 3, lines 17-19 provides that the voltage Vd of the signal line 14 *changes at an interval of the horizontal scanning cycle* to charge the pixel elctrodes selected in succesion to the desired voltage. It is respectfully submitted that such a discussion describes or suggest a driving method where tones are displayed by a voltage variance technique. Such a volyage variance technique is inherently inconsistent with a pulse width modualtion technique. In the voltage variance technique the voltage applied to the signal line is varied between different values based on the tone to be displayed and this voltage is applied over a constant pulse width.

In sum, the only teaching in Kikkawa that might relate to a technique used to display or express tones is the voltage variance technique not a pulse width modulaiton technique.

For purposes of clarity, Applicants amended the last wherein clause of claim 3 in the foregoing amendment so it is clear that the pulse width difference occurs even when the same tone is being displayed in the positive and a negative voltage is being applied to the pixel

electrode. Specifically, the wherein clause was amended to provide that the pulse width of a supplied voltage to the signal lines in the conduction period of the pixel switching elements when a positive polarity voltage is applied to the pixel electrodes is different from the pulse width of a supplied voltage to the signal lines in the conduction period of the pixel switching elements when a negative polarity voltage is applied to the pixel electrodes, when the same tone is being displayed.

There also is no discsssion anywhere in Kikkawa that teaches or suggests that the pulse width of voltage applied to the signal line to express a tone would be different based on the polarity of the voltage even when the tone to be expressed was the same value. In other words, Kikkawa does not describe, teach or suggest that the expression of a ½ tone the pulse wdith in the positive voltage frame would involve the use of a pulse width that would be diffeerent from the pulse width in the negative voltage frame also used to express a ½ tone. This is not surprising as Kikkawa does not talk about puilse width modulation.

As the USPTO Board of Patent Appeals and Interferences has held, "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without benefit of appellant's specification, to make the necessary changes in the reference device." *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ351, 353 (BD. Pat. App. & Inter. 1984).

It is respectfully submitted that claim 3 is patentable over the cited reference(s) for the foregoing reasons.

Claim 6

As grounds for the rejection, the Office Action refers to the simulation potentials described in Kikkawa and the resultant potential across the pixel electrode (*i.e.*, voltage difference between the common electrode Vcom and the voltage applied to the signal line) in what Kikkawa refers to as the positive and the negative voltage frame period.

Applicants claim, claim 6, a method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines. Such a method further provides that the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines and a maximum value of an amplitude of the voltage applied to the pixel electrodes is in a range of not less than 80 percent and not more than 98 percent of an amplitude of a voltage supplied to the signal lines.

As indicated above concerning the rejection of claim 3, the terms pulse width, tone, pulse width modulation and PWM do not appear anywhere in Kikkawa. Although voltage pulses are

depicted in Figures 4, 7 and 10 of Kikkawa; such a dislcosure hardly corresponds to an indication of the technique used for displaying or expressing tones. Applicants also refer to the foregoing related remarks provided above concerning the rejeciton of claim 2.

There is no teaching anywhere in in Kikkawa that a maximum value of an amplitude of the voltage applied to the pixel electrodes is in a range of not less than 80 percent and not more than 98 percent of an amplitude of a voltage supplied to the signal lines. Nor can such a teaching be inferred from any teachings or descriptions in Kikkawa.

It also is clear from the discussion in the subject application that the term "an amplitude of the voltage applied to the pixel electrodes" does not correspond to the voltage between the signal line and the common electrode. The discussion in Kikkawa is confined to providing the voltage value applied to the signal line and the voltage value for the common electrode and providing that the voltage across the pixel would correspond to the difference between thse two voltages. Stated another way, Kikkawa does not describe charging the pixel so that the voltage being applied to the pixel electrode is less than the voltage applied to the signal line and also that a proportion of the maximuam value of voltage applied to the pixel electrodes with respect to the voltage supplied to th e the signal lines is different between a positive polarity voltage being applied to the pixel electrodes and a negative polarity voltage being applied to the pixel elctrodes. Such a disclosure and teaching woud be inconsistent with the operation and function of the LCD and the emboided methodlogy described and taught in Kikkawa.

The Federal Circuit has indicated in connection with 35 U.S.C. §102 that in deciding the issue of anticipation, the trier of fact must identify the elements of the claims, determine their meaning in light of the specification and prosecution history, and identify *corresponding elements* disclosed in the allegedly anticipating reference (emphasis added, citations in support omitted). *Lindemann Maschinenfabrik GMBM v. American Hoist and Derrick Company et al.*, 730 F. 2d 1452, 221 USPQ 481,485 (Fed. Cir. 1984). Notwithstanding that the instant rejection is under 35 U.S.C. §103, in the present case the Examiner has not shown that phrase "maximum value of an amplitude of the voltage applied to the pixel electrodes is in a range of not less than 80 percent and not more than 98 percent of an amplitude of a voltage supplied to the signal lines" corresponds, as that term is used above by the Federal Circuit, in any fashion to any feature or characteristic of the liquid crystal display device described in Kikkawa as well as any method embodied in such a display.

It is respectfully submitted that claim 6 is patentable over the cited reference(s) for the foregoing reasons.

In sum, it is respectfully submitted that claims 2, 3 and 6 are patentable over the cited reference(s) for the foregoing reasons.

CLAIM 4

Claim 4 stands rejected as being unpatentable over Kikkawa [USP 6,577,295] in view of Hirakata et al. [USP 5,847,687; "Hirakata"] for the reasons provided on pages 4-5 of the above referenced Office Action.

The Office Action asserts that Kikkawa teaches all the limitations of claim 4 except that of providing the single scanning line is different for each polarity of the voltage applied to pixel electrodes. It is further asserted that Hirakata teaches the same scan line having different polarities and that it would have been obvious to utilize the teaching of Hirakata in the active matrix LCD disclosed by Kikkawa apparently to yield the driving method of claim 4. Applicants respectfully traverse.

Applicants claim, claim 4, a method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines. According to this method, the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines and an allocated time for a single scanning line is different for each polarity of the voltage applied to the pixel electrodes.

It is clear from the discussion on page 40 of the subject application, that allocation time of the signal line is related to the charging time of the pixel. As indicated in the discussion above concerning the rejection of claim 3, Kikkawa nowhere discloses, teaches or suggests expressing tones by using a pulse width modulation technique; rather Kikkawa describes a voltage variance technique for expressing tones. As such, it cannot be said that Kikkawa discloses, teaches or suggest an allocated time for a single scanning line being different for each polarity of the voltage applied to the pixel electrodes. It also is clear that such a change to the operation of the LCD display in Kikkawa would change the intended purpose, function and operation of the LCD described ion Kiakkawa.

In addition, it appears that the Examiner is of the position that Hirakata discloses or teaches in column 6, line 31 that the pixels associated with the same scan line have different polarities. According to column 6, lines 25-31, however, the invention of Hirakata is effective for inverting schemes such as field inversion and gate line inversion in which the pixels associated with the same scan line have the same polarity. In fact the advantages described in Hirakata cannot be obtained in inverting schemes such as source line inversion and dot inversion in which the pixels associated with the same scan line have different polarities. Thus, it is respectfully submitted that no one skilled in the art would have combined the teachings of Hirakata with Kikkawa which employs dot inversion.

As described above, Kikkawa does not deal with pulse width modulation driving. Moreover, Kikkawa does not disclose a technique in which, due to the difference in a function of

a charging time between a positive application and a negative application, a time allocated to each scan line becomes different depending on a polarity of the voltage applied to the pixel electrodes. Further, such technique is not described in Hirakata, either.

Also and in contrast to the assertion in the Office Action, the cited discussion in Hirakata specifically teaches away from the use of scan lines having different polarities.

It also is respectfully submitted that the "scan line" in Hirakata does not correspond to a signal line of the presently claimed invention. The discussion in cols 5-6 of Hirakata provides that the pixel electrode potential is determined by a potential Vp of the data lines. Thus, it is clear that the data lines in Hirakata correspond to the signal lines of the presently claimed invention. Therefore, the discussion referred to in Hirakata is not relevant to the teachings of the presently claimed invention.

As provided in MPEP-2145 (XD) a prior art reference that "teaches away" from the claimed invention is significant factor to be considered in determining obviousness. It also is provided therein that the totality of the prior art must be considered, and proceeding contrary to accepted wisdom in the art is evidence of non-obviousness. *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986).

It is respectfully submitted that claim 6 is patentable over the cited reference(s) for the foregoing reasons.

The following additional remarks shall apply to each of the above.

As provided in MPEP 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F. 2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F. 2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As provided above, the references cited, alone or in combination, include no such teaching, suggestion or motivation.

Furthermore, and as provided in MPEP 2143.02, a prior art reference can be combined or modified to reject claims as obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 19866). Additionally, it also has been held that if the proposed modification or combination would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. Further, and as provided in MPEP-2143, the teaching or suggestion to make the claimed combination and the reasonable suggestion of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). As can be seen from the forgoing discussion regarding the disclosures of the cited references, there is no reasonable expectation of success provided in the references. Also, it is clear from the foregoing discussion that the modification suggested by

the Examiner would change the principle of operation of the device and methodology disclosed in the respective primary reference.

As the Federal circuit has stated, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260,1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. *Para-Ordance Mfg. v. SGS Importers Int'l, Inc.*, 73 F.2d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995). It is respectfully submitted that for the foregoing reasons, claims 2-4, 6-9, 16, 17, 19-22, 24-27, and 44-53 are patentable over the cited reference(s) and therefore, satisfy the requirements of 35 U.S.C. §103. As such, these claims, including the claims dependent therefrom are allowable.

CLAIMS 10-13 & 38-43

In the above-referenced Office Action, claims 10-13 and 38-43 were objected to as being dependent upon a rejected base claim. It also was provided in the above-referenced Office Action, however, that these claims would be allowable if rewritten in independent form to include all the limitations of the base claim and any intervening claim(s).

Claims 10-13 and 38-43 were re-written in the foregoing amendment so as to be in independent form and to include all the limitations of the base claim in the case where there was no

intervening claim(s) or to include all the limitations of the base claim and the intervening claim(s) in the case where there is an intervening claims. Accordingly, claims 10-13 and 38-43 are considered to be in allowable form.

OTHER MATTERS

Applicants filed a Supplemental Information Disclosure Statement/ Search Report Information Disclosure Statement dated June 21, 2005, which IDS post-dates the above-referenced Office Action. Accordingly, Applicants respectfully request that the Examiner reflect their consideration of this IDS in the next official communication from the USPTO. Applicants also respectfully request the Examiner to call the undersigned collect and the below number in the event that this IDS and/or the attachments/ enclosures thereto have not been received by the Examiner and thus needs to be again submitted by Applicants for the Examiner's consideration.

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested.

Applicants believe that additional fees are not required for consideration of the within Response. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed

for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit

Account No. **04-1105**.

Respectfully submitted,
Edwards & Angell, LLP

Date: September 6, 2005 By: _____

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